(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 August 2004 (05.08.2004)

PCT

(10) International Publication Number
WO 2004/065687 A1

(51) International Patent Classification[7]: D21D 5/16, B01D 33/23

(21) International Application Number: PCT/SE2004/000014

(22) International Filing Date: 12 January 2004 (12.01.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0300169-0 23 January 2003 (23.01.2003) SE

(71) Applicant *(for all designated States except US)*: **GL & V SWEDEN AB** [SE/SE]; Box 100, S-129 22 Stockholm (SE).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **HÄGG, Conny** [SE/SE]; Finnholmsvägen 8, S-141 42 Huddinge (SE).

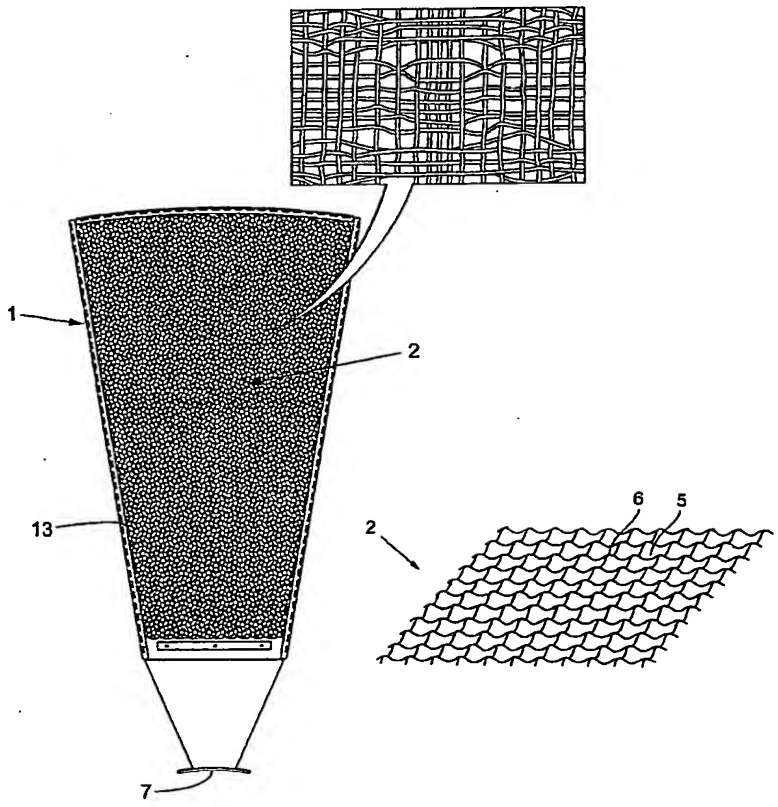
(74) Agents: **HAGSTRÖM, Leif** et al.; Bergenstråhle & Lindvall AB, Box 17704, S-118 93 Stockholm (SE).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK,

[Continued on next page]

(54) Title: FILTER SECTOR FOR USE IN ROTARY DISC FILTERS FOR SEPARATING PULP SUSPENSIONS



(57) Abstract: A filter sector (1) for use in rotary disc filters for separating pulp suspensions comprises opposite filtration walls (2) of a substantially rigid, wherein a filtrate chamber (4) is formed between the filtration walls for receiving filtrate that has flowed through the filtration walls. Each filtration wall is profiled to form a multiplicity of cavities (5) and humps (6), and each cavity and hump, respectively, includes a multiplicity of meshes of the net. The provision of cavities and humps increases the effective filtering area of the filter sector, which results in increased capacity of the filter sector.

WO 2004/065687 A1

TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Filter sector for use in rotary disc filters for separating pulp suspensions

The present invention relates to a filter sector for use in rotary disc filters for separating suspensions, such as pulp suspensions. The filter sector comprises a first filtration wall of a substantially rigid net, and a second filtration wall of a substantially rigid net opposite the first filtration wall, a filtrate chamber being formed between the first and second filtration walls for receiving filtrate that has flowed through the first and second filtration walls. The filtrations walls are profiled to increase the filtration capacity of the filter sector. Filter sectors of this kind are assembled to form circular filter discs for rotary disc filters.

In a known filter sector of this kind, according to Swedish patent application 9901154-6, the filtration walls of net are corrugated to form a plurality of ridges and valleys. As a result, the known filter sector has a greater filtration capacity than that of a traditional filter sector having planar walls of filter cloth.

The object of the present invention is to provide a new filter sector that also has a greater filtration capacity than that of a traditional filter sector.

This object is obtained by the filter sector described initially characterised in that each filtration wall is profiled to form a multiplicity of cavities and humps, and that each cavity and hump, respectively, includes a multiplicity of meshes of the net. As a result, the effective filtration area of the filter sector is increased as compared with a filter sector of the same size with planar walls of

net, whereby the filtration capacity of the filter sector of the invention is improved.

In a preferred embodiment of the invention, the cavities and humps, respectively, are oriented in rows with the rows of cavities alternating with the rows of humps.

Advantageously, weaving forms the cavities and humps of the net, *i.e.* a special weaving technique is employed while weaving the net, which makes the new filter sector inexpensive to manufacture. Alternatively, pressing may form the cavities and humps of the net.

Each cavity and hump, respectively, may be defined by four straight sides, wherein each straight side of a cavity is common to one of the four straight sides of an adjacent hump.

The first and second walls of the net may take the shape of a bag.

In another embodiment of the invention, the filter sector comprises first and second support walls made of a planar metal net that is coarser than the net of the filtration walls, wherein the first and second support walls support the first and second filtration walls, respectively. The support walls may be joined to each other at the radial sides of the filter sector, whereby the filtration walls and support walls form a bag-shaped filter unit.

The present invention is described in more detail in the following with reference to the accompanying drawings, in which

Figure 1 is a front view of an embodiment of the filter sector according to the present invention,

Figure 2 is an enlarged detail of the filtration net wall of the filter sector shown in Figure 1, illustrating the woven pattern of the net,

Figure 3 schematically illustrates humps and cavities formed in the filtration net wall,

Figure 4 is a sectional view of the filter sector of Figure 1,

Figure 5 is a filter unit forming part of the embodiment shown in Figure 4, and

Figure 6 is a sector frame forming part of the embodiment shown in Figure 4.

Figure 1 shows a filter sector 1 according to an embodiment of the present invention comprising two opposite filtration walls 2 and 3 of a substantially rigid metal net defining a filtrate chamber 4 for receiving filtrate that has flowed through the filtration walls 2,3. Each filtration net wall 2 and 3, respectively, is woven in accordance with a special pattern that forms a multiplicity of four-sided cavities 5 and humps 6, each of which includes a multiplicity of meshes of the net. Figure 2 illustrates the individual threads in this pattern and figure 3 schematically illustrates the resulted cavities 5 and humps 6 of the net walls 2,3.

A filtrate outlet 7 for filtrate that has flowed through the filtration walls 2,3 to the filtrate chamber 4 is provided at the radial inner end of the filter sector 1. A plurality of such filter sectors 1 are intended to be assembled to form a circular filter disc that is used in a rotary disc filter for separating suspensions, such as fibre pulp suspensions.

With reference to Figures 4-6, the filtration walls 2 and 3 are joined to two stiff support walls 8 and 9, respectively, made of a planar metal net that is coarser than the net of the filtration walls 2,3. The support walls 8,9 are joined to each

other at the radial sides of the filter sector 1, whereby the filtration walls 2,3 and support walls 8,9 form a bag-shaped filter unit 10. (As an alternative, however, the support walls 8,9 may not be joined together, so that the filtration wall 2 and support wall 8 form a first separate unit and the filtration wall 3 and support wall 9 form a second separate unit.) The bag-shaped filter unit 10 fits on a sector-shaped rigid grid frame 11 that forms a central filtrate channel 12. The assemblage of the bag-shaped unit 10 and the grid frame 11 (illustrated in Figure 4) is releasably secured to a frame 13 of the filter sector 1.

In case the specific use of the filter sector 1 permits a design of the filtration walls 2,3 in which the metal net can be made stiff enough, the support walls 8,9 of coarser net may be omitted. In such a case the filtration walls 2,3 may either be separate from each other or be joined to each other to form a bag-shaped unit.

In operation, several filter sectors 1 are joined to one another to form a filter disc, which is rotated partially immersed in a pool of a suspension to be separated. A pressure difference is created across the filtration walls 2,3 while they are immersed in the suspension during the rotation of the disc, so that a filtrate of the suspension is pressed through the filtration walls 2,3 into the filtrate chamber 4, while coarse particles, such as fibres, of the suspension deposit on the external sides of the filtration walls 2,3. The filtrate flows further through the support walls 8,9 of coarser metal net into the filtrate channel 12. In the filtrate channel 12 the filtrate changes flow direction from a substantially axial direction to a substantially radially inward direction towards the filtrate outlet 7. The separated coarse particles are normally removed from the filtration walls 2,3, as they are

above the pool of suspension, by the action of liquid jets sprayed onto the filtration walls 2,3.

Claims

1. A filter sector (1) for use in rotary disc filters for separating suspensions, the filter sector comprising a first filtration wall (2) of a substantially rigid net, and a second filtration wall (3) of a substantially rigid net opposite the first filtration wall, a filtrate chamber (4) being formed between the first and second filtration walls for receiving filtrate that has flowed through the first and second filtration walls, wherein the filtrations walls are profiled to increase the filtration capacity of the filter sector, **characterised** in that each filtration wall (2,3) is profiled to form a multiplicity of cavities (5) and humps (6), and that each cavity and hump, respectively, includes a multiplicity of meshes of the net.

2. A filter sector according to claim 1, wherein the cavities (5) and humps (6), respectively, are oriented in rows with the rows of cavities alternating with the rows of humps.

3. A filter sector according to claim 1 or 2, wherein the cavities (5) and humps (6) are formed by weaving the net.

4. A filter sector according to claim 1 or 2, wherein the cavities (5) and humps (6) are formed by pressing.

5. A filter sector according to any one of claims 1 - 4, wherein each cavity (5) and hump (6), respectively, is defined by four straight sides.

6. A filter sector according to claim 5, wherein each straight side of a cavity (5) is common to one of the four straight sides of an adjacent hump (6).

7. A filter sector according to any one of claims 1-6, wherein the first and second filtration walls (2,3) of the net take the shape of a bag.

8. A filter sector according to any one of claims 1-6, further comprising first and second support walls (8,9) made of a planar metal net that is coarser than the net of the filtration walls (2,3), wherein the first and second support walls support the first and second filtration walls, respectively.

9. A filter sector according to claim 8, wherein the support walls (8,9) are joined to each other at the radial sides of the filter sector, whereby the filtration walls (2,3) and support walls (8,9) form a bag-shaped filter unit (10).

10. A filter sector according to any one of claims 1-9, wherein the net of the filtration walls (2,3) comprises a metal net.

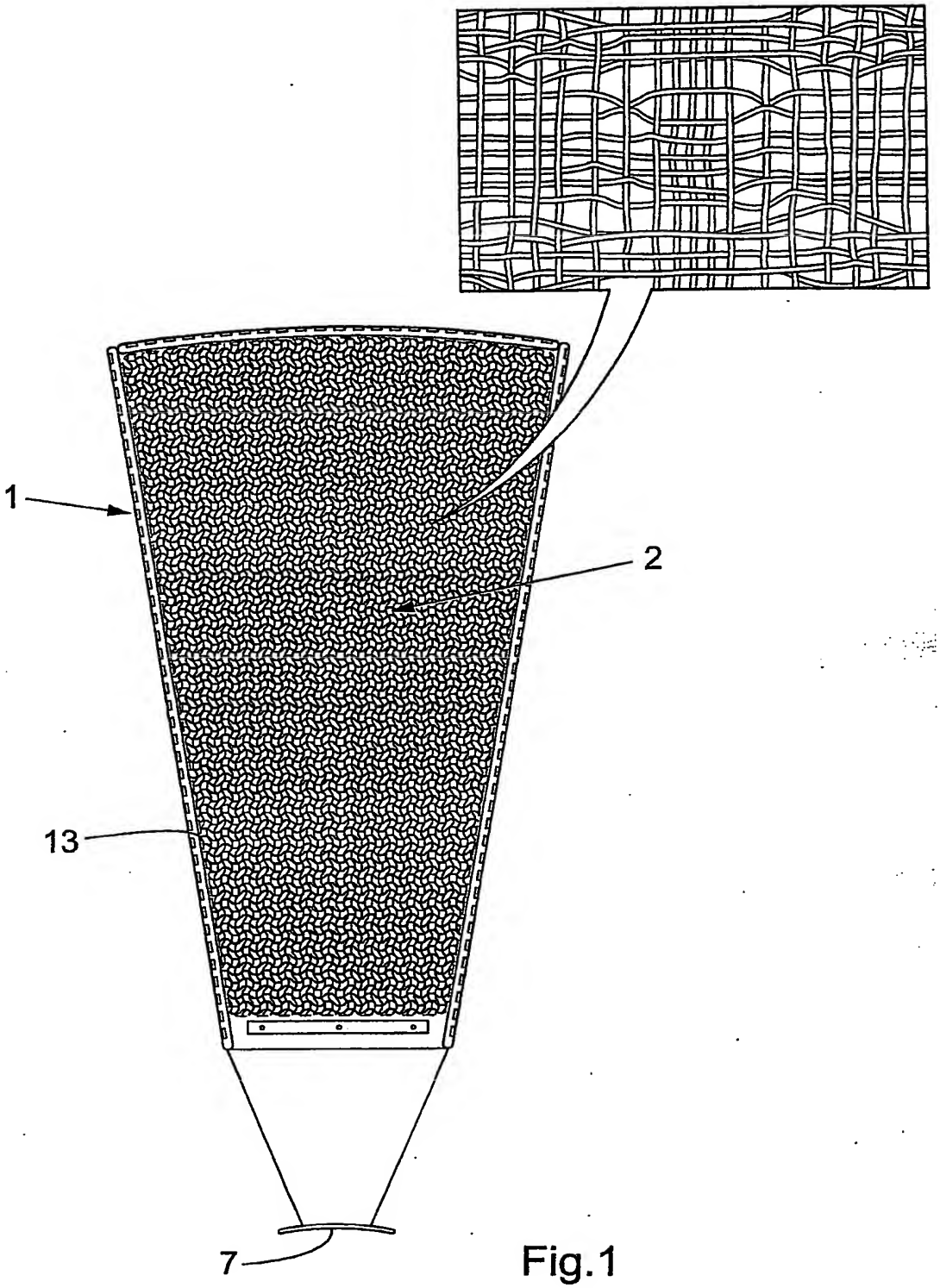


Fig.1

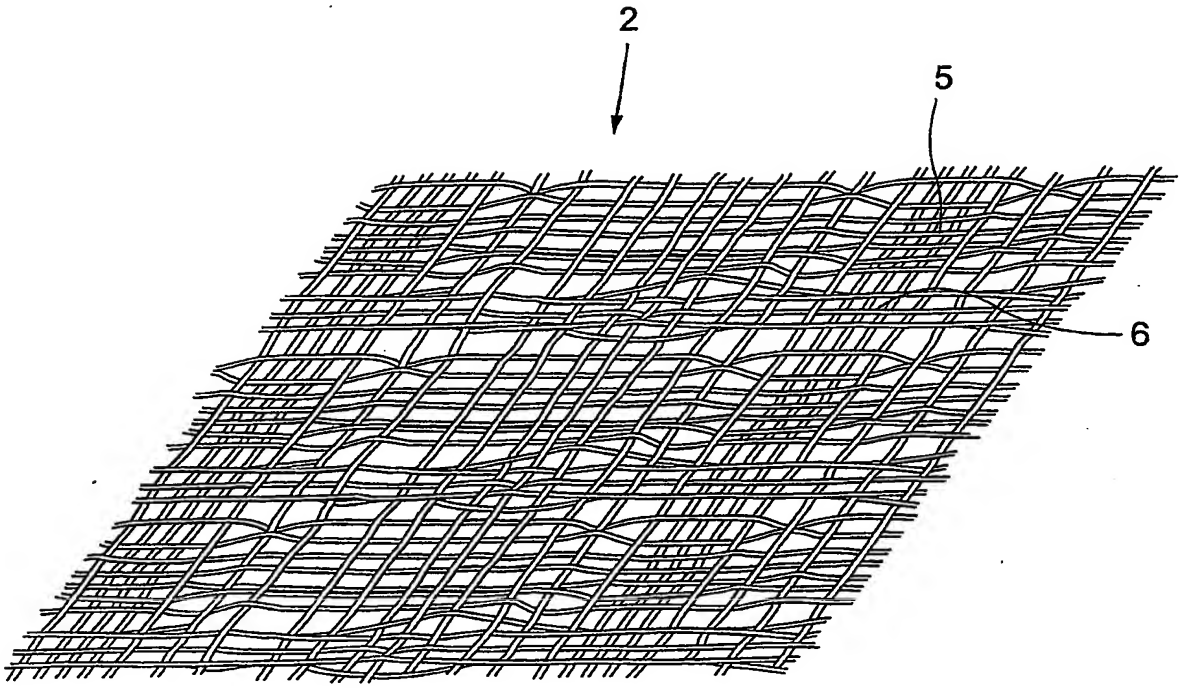


Fig.2

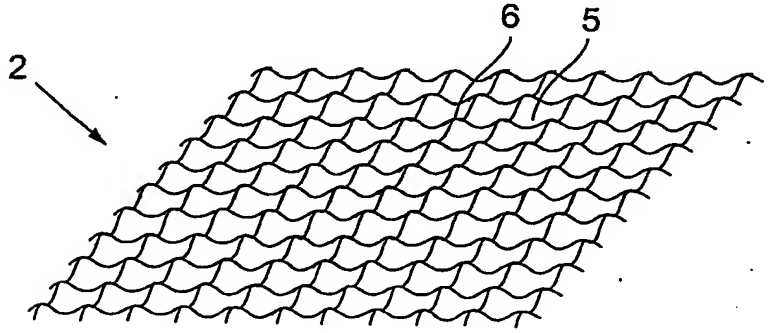


Fig.3

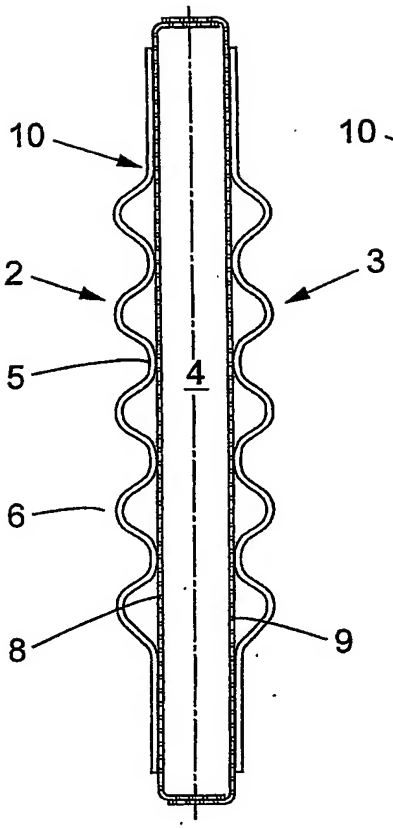


Fig.5

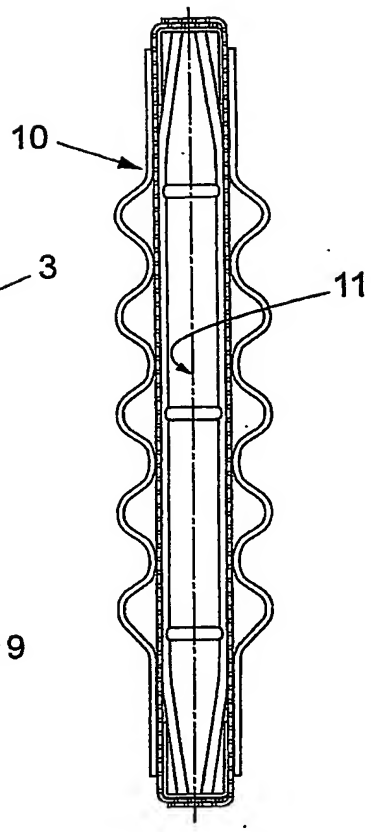


Fig.4

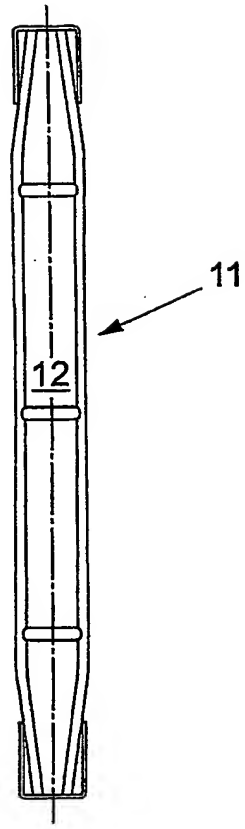


Fig.6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 2004/000014

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: D21D 5/16, B01D 33/23
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: D21D, B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5227065 A (KENT STRID), 13 July 1993 (13.07.1993) --	1-10
A	US 6113783 A (KENT STRID ET AL), 5 Sept 2000 (05.09.2000) --	1-10
A	US 5792352 A (PETER SCHEUCHER ET AL), 11 August 1998 (11.08.1998) --	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 April 2004	22 -04- 2004
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Erika Westberg/Els Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (January 2004)

US	5227065	A	13/07/1993	AT	122253	T 15/05/1995
				CA	2064475	A,C 23/03/1991
				DE	69019362	D,T 02/11/1995
				EP	0493499	A,B 08/07/1992
				SE	0493499	T3
				FI	93700	B,C 15/02/1995
				FI	921116	A 16/03/1992
				JP	5500471	T 04/02/1993
				NO	177955	B,C 18/09/1995
				NO	921082	A 19/03/1992
				SE	465658	B,C 14/10/1991
				SE	8903128	A 23/03/1991
				WO	9104090	A 04/04/1991
US	6113783	A	05/09/2000	CA	2265792	A 26/03/1998
				EP	0938359	A 01/09/1999
				NO	991315	A 19/05/1999
				SE	510746	C 21/06/1999
				SE	9603430	A 20/03/1998
				WO	9811972	A 26/03/1998
				AU	7353798	A 24/11/1998
				DE	69816433	D 00/00/0000
				EP	0977530	A,B 09/02/2000
				SE	511781	C 22/11/1999
				SE	9701570	A 26/10/1998
				WO	9848744	A 05/11/1998
US	5792352	A	11/08/1998	AT	172394	A 15/01/1996
				AT	401355	B 26/08/1996
				DE	19531614	A,C 30/05/1996
				SE	518393	C 01/10/2002
				SE	9503070	A 09/03/1996